NATURAL RESOURCES

INACTIVE AND ABANDONED MINE LANDS— Gladstone and Electric Point Mines, Northport Mining District, Stevens County, Washington

by Fritz E. Wolff,
Donald T. McKay, Jr.,
and David K. Norman

WASHINGTON
DIVISION OF GEOLOGY
AND EARTH RESOURCES
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INTRODUCTION

The Washington State Department of Natural Resources (DNR), Division of Geology and Earth Resources (DGER) is building a database and geographic information system (GIS) coverage of major mines in the state. Site characterization was initiated in 1999 (Norman, 2000). Work is funded through interagency grants from the U.S. Forest Service, Region 6. Other agencies sharing in the project are the U.S. Bureau of Land Management (BLM), the U.S. Environmental Protection Agency (EPA), and the Washington Department of Ecology (DOE).

More than 3800 mineral properties have been located in the state during the last 100 years (Huntting, 1956). Many are undeveloped prospects of little economic importance. Therefore, in considering the population to include in the Inactive and Abandoned Mine Lands (IAML) inventory, we have identified approximately 60 sites that meet one of the following criteria: (a) more than 2000 feet of underground development, (b) more than 10,000 tons of production, (c) location of a known mill site or smelter. This subset of sites includes only metal mines no longer in operation.

We have chosen to use the term *inactive* in the project's title in addition to the term *abandoned* because it more precisely describes the land-use situation regarding mining and avoids any political or legal implications of surrendering an interest

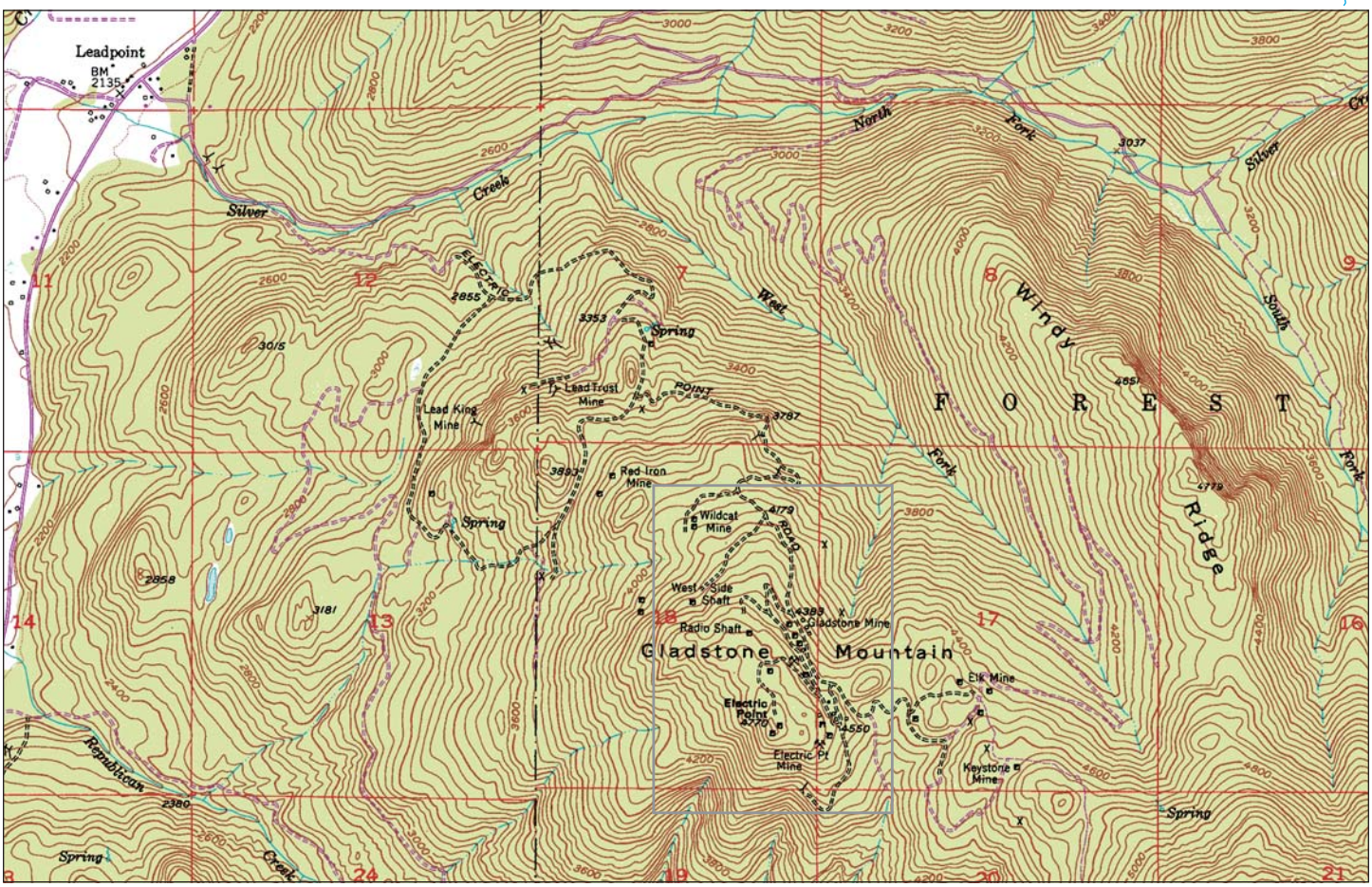
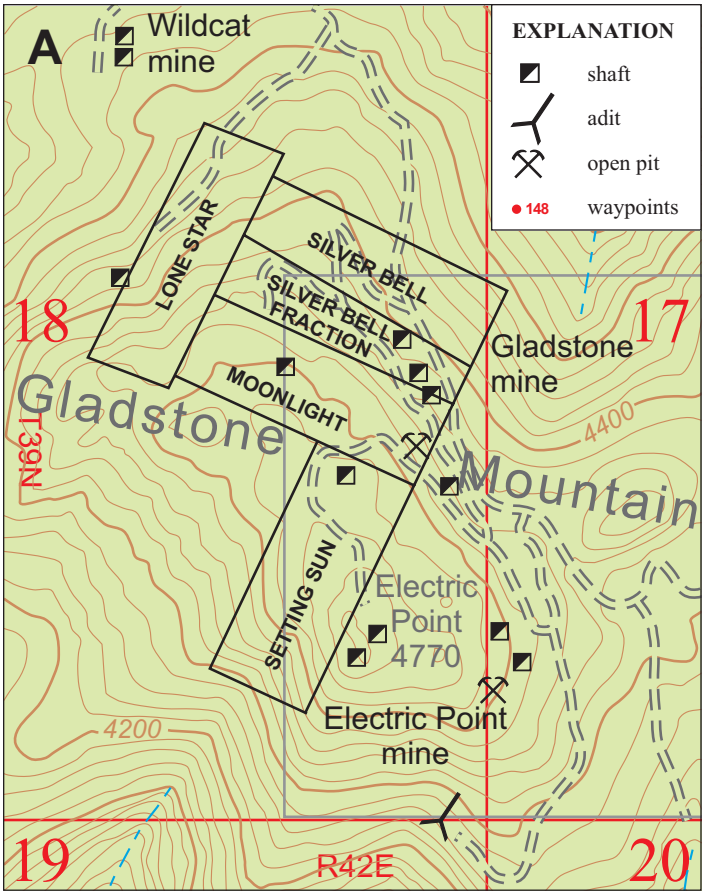


Figure 1. Map showing the location of the Gladstone and Electric Point mines in Stevens County (top) and a more detailed map of the mine sites (bottom). Section lines are 1 mile apart. Gray box shows area of Figure 2A.



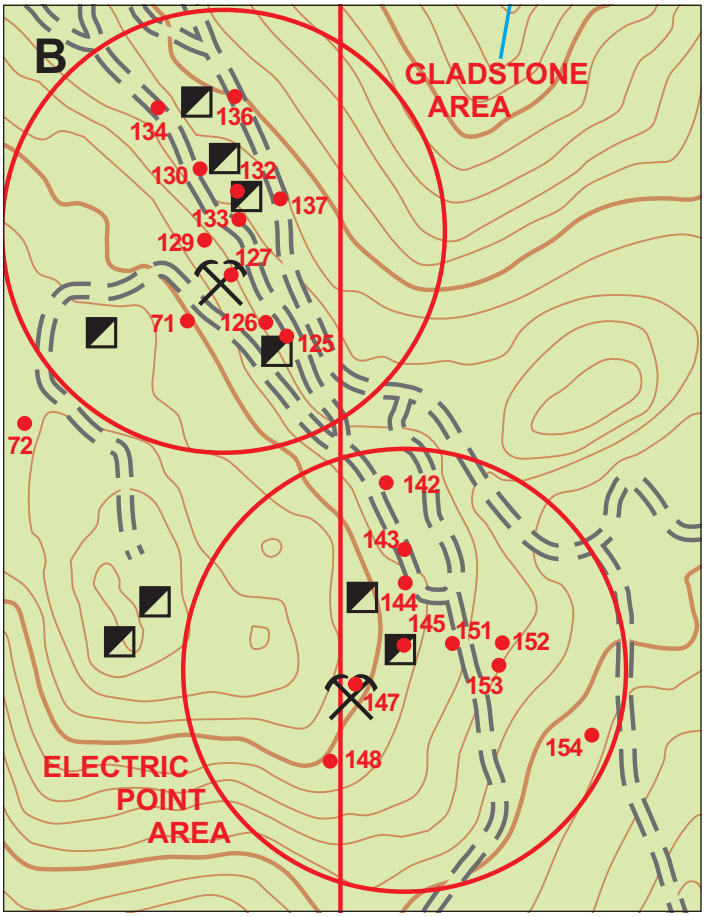


Figure 2. A. Location of patented claims for Gladstone mine. Claim boundaries and location are approximate from available information. Gray box in lower righthand corner shows location of Figure 2B. **B.** Detailed site map showing GPS waypoints. Descriptions of waypoints given in table below. GL, Gladstone mine; EP, Electric Point mine. Location of waypoints relative to each other is accurate, location relative to map topography is approximate; see Table 2 for latitude and longitude.

No.	Feature
71	GL patented claim corner common to SE cor. Moonlight, NE cor. Setting Sun
72	GL dozer trench, typical circa-1946 excavations
125	GL open cut
126	GL open pit
127	GL open shaft "Moonlight" west of access road; conical waste pile on east side of access road (sample site)
129	GL open shaft "Anderson"
130	GL open pit
132	GL subsidence in road
133	GL mill site (sampled waste pile next to mill)
134	GL open pit

No.	Feature
136	GL glory hole
137	GL tailings, waste rock dump
142	EP burned buildings, waste rock dump
143	EP open pit and adit in sidewall
144	EP open pit and adit in sidewall
145	EP open pit
147	EP glory hole
148	EP caved "300 level" adit
151	EP waste rock dump above mill site
152	EP impoundment basin for mill (no water)
153	EP mill site
154	EP tailings

to a property that may re-open with changes in economics, technology, or commodity importance.

The IAML database focuses on physical characteristics and hazards (openings, structures, materials, and waste) and water-related issues (acid mine drainage and/or metals transport). Accurate location, current ownership, and land status information are also included. Acquisition of this information is a critical first step in any systematic approach to determine if remedial or reclamation activities are warranted at a particular mine. Open-File Reports (OFRs), such as this one, provide documentation on mines or groups of mines within specific mining districts or counties. The IAML database may be viewed with assistance from DGER personnel. IAML OFRs are posted online at http://www.dnr.wa.gov/geology/pubs/.

SUMMARY

The Gladstone and Electric Point mines lie adjacent to one another on the summit of Gladstone Mountain at 4732 feet elevation (Fig. 1). Historically they have had separate and distinct ownership and operations but mined similar, extremely high-grade and unique ore bodies. Five claims were given patent status in 1946 at the request of Gladstone Mountain Mining Co. (Fig. 2A). Nine Electric Point claims were surveyed at the same time, but never patented. They adjoined the Gladstone group to the southeast on Colville National Forest lands. The two mines cover portions of secs. 17 and 18, T39N R42E. No unpatented mining claims were active in these sections as of March 2004 (BLM, written commun., 2004). Figure 2B is a site map showing GPS waypoints taken by DGER personnel.

Total output from the two properties through 1976 is approximately 23,000 tons of lead, 28 tons of zinc, and 17,000 ounces

of silver (Mills, 1977). Ore occurred as boulders of solid galena admixed with granular cerussite in a matrix of limonite. Consequently, preparation of ore for shipment consisted of mechanically separating the three fractions by hand sorting or screening. Carloads of direct-ship sulfide ore averaged 70 percent lead; shipments of carbonate ore averaged 27 percent lead (Jenkins, 1924).

Mineralization occurred in vertical, highly oxidized chimneys at both mines. The chimneys are circular or oval in plan view, ranging from 30 to 150 feet in maximum diameter and from 150 to 800 feet in depth. At Electric Point, a glory hole sunk on one of the chimneys is roughly 150 feet in diameter by 300 feet deep. The walls are vertical and the perimeter is unfenced. This feature is one of the most hazardous surface excavations thus far documented in the IAML survey (Fig. 3).

The glory hole and the remainder of the Electric Point mine lie within the Colville National Forest. At one time, the principal access to the Electric Point mine was through an 800-foot inclined shaft, which we believe was removed in the 1950s when the glory hole was excavated by dragline. The Gladstone mine has at least five vertical shafts along the access road. Most are caved shut and obliterated by surface disturbance. Two shafts that we identified as the Moonlight and Anderson, after Cole (1949), are open and unprotected (Figs. 4 and 5). A mid-shaft blockage we observed at the Moonlight location in our first visit (Sept. 2001) had fallen through to a greater depth at the time of the second visit (Sept. 2002).

Discovery and development at both properties began circa 1916. Combined ore production peaked during World War I at 15,000 tons and declined steadily to 4700 tons in 1926. During this initial 10-year period, the Electric Point Mining Co. returned $468,000 in dividends to stockholders; dividends of $393,000 were paid by the Gladstone Mountain Mining Co. (DGER mine files). From 1926 through 1956, the properties were leased by a wide variety of miners and went through contentious changes in ownership, one receivership, and other litigation. Work by mining interests during this latter 30-year period consisted of renovating existing shafts and openings long enough to extract a few hundred tons of ore per year.

The U.S. Bureau of Mines (USBM) conducted a significant exploration study of both properties in 1946. More than 14,000 feet of dozer trenches were dug in an effort to scrape away glacial alluvium overlying the limestone cap rock, thus exposing limonitic gossan material as the most prominent prospecting target. Samples of outcrops and dumps at 94 locations were analyzed for lead, zinc, and silver (Cole, 1949). These trenches are still open, largely barren, and have erased observable geologic features almost entirely (Fig. 6). This work discovered additional chimneys, but found no economic mineralization up to the extent of excavation. Cole estimated the volume of waste rock dumps on the two properties at 40,000 tons with a gross lead metal content of approximately 1000 tons. Cole's extensive sampling indicated that the waste rock dumps at both sites contained 0.5 to 10 percent lead, 0.05 to 2.57 percent zinc, and 13 to 28 percent iron. We sampled heavily iron-stained piles on the Gladstone property at waypoints 127 and 133 (Fig. 2B; Table 3) with analyses almost identical to those reported by Cole. The results for lead and zinc exceed levels for unrestricted use shown in Table 4 (Model Toxics Control Act) by many levels of magnitude. The last entry in DGER mine files for Electric Point was a shaft-sinking and open-pit-benching operation carried out in 1964 by Shamrock Mining Co. under a lease from Gladstone Mountain Mining Co.

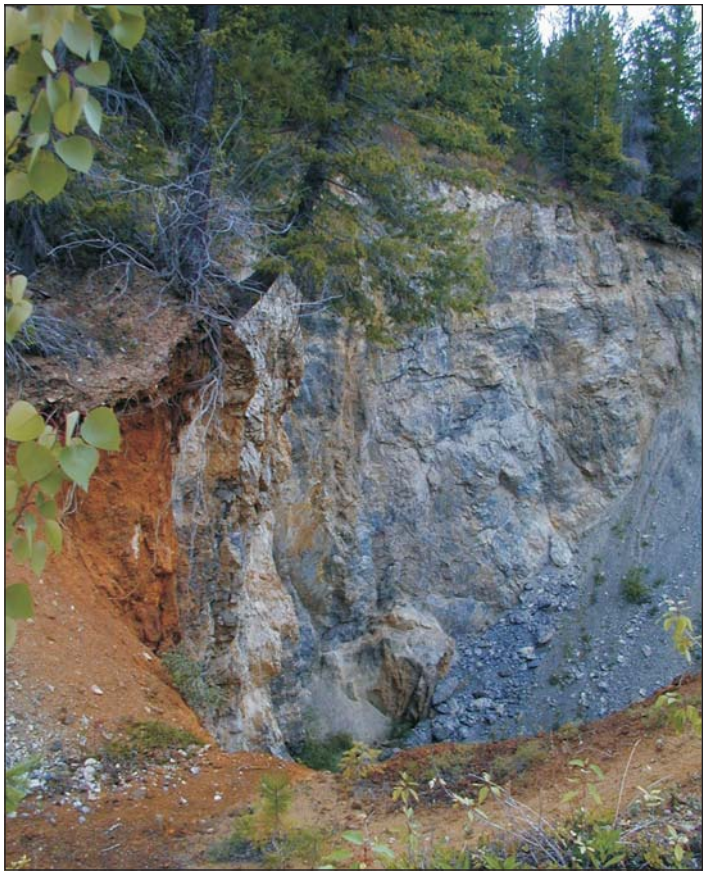


Figure 3. Glory hole at Electric Point mine. View to the west.

Figure 4. Moonlight shaft collar, Gladstone mine.

At the time of Jenkins's visit in 1924, the Electric Point mine development totaled 9600 feet—one 800-foot inclined shaft with levels at 100-foot intervals, an 850-foot long adit (level 3) from the south side of the mountain, and numerous drifts and crosscuts. Horizontal development at Gladstone was in the neighborhood of 4000 feet. At least seven shafts have been sunk on the Gladstone property. We found locations or suspected locations of five. None exceeded 300 feet in depth. The overall appearance of these properties resembles a moonscape of excavations, some dating from the 1920s, some appearing to have been dug in the 1960s. One report indicates that the 300-foot-deep glory hole on the Electric Point property was excavated from the surface by a dragline and clamshell bucket (DGER mine file). It is almost impossible to separate new from old, in-situ material from disturbed.

No water was found on the claims. Early reports indicate that even the 800 level in the Electric Point mine was absolutely dry.

The properties are best reached from the hamlet of Leadpoint by following the Silver Creek Road east to a junction with a logging road leading up Windy Ridge along West Fork Silver Creek. This route approaches the two mines from the east. An alternate route leading up the north and west slope of Gladstone Mountain is not recommended.

Figure 5. Anderson shaft collar, Gladstone mine.

Figure 6. Typical exposure of circa-1946 dozer trenching, Gladstone mine.

OWNERSHIP

As might be expected in a remote area of high interest and potential, ownership of mineral rights on Gladstone Mountain since discovery resembles a patchwork quilt of companies, individuals, lessees, and lessors, some of whom probably held legitimate title or made that assumption (Appendices B and C).

It appears from the available data that Gladstone Mountain Mining Co. maintained a fiduciary interest in that property from 1917 through at least 1975, at which time they reorganized under the name Gladstone Resources, Inc. They reorganized again in 1999 as Gladstone Energy. The principal Gladstone mine claims (Silver Bell, Silver Bell Fraction, Moonlight, Lone Star, and Setting Sun, totaling 77 acres) were patented in fee simple in July 1950. R. D. MacArthur of Cusick, Wash., is the present owner (Stevens Co. Assessor, written commun., 2004). Mineral Survey 1254, performed in November 1946, describes the metes and bounds for this group (BLM, written commun., 2004). A copy of this survey is available in DGER mine files and from the BLM database. The Electric Point mine unpatented claims were surveyed for patent (Mineral Survey 1104), but the application was withdrawn. The former claims are now part of Colville National Forest.

HISTORY

J. E. Yoder made the first significant discovery of lead mineralization on Gladstone Mountain near the summit in 1915, which resulted in development of the Electric Point mine. It was named after the frequency of lightning strikes on the property. A year later, other parties staked the Gladstone property. From 1916 to 1926, both mines were in production almost continuously. From 1926 through 1956, lessors high-graded galena boulders, one of which weighed 9 tons, from various openings (Fulkerson and Kingston, 1958). Most run-of-mine ore was shipped directly to the Northport Smelter prior to its closure in 1922 and afterwards to Cominco at Trail, B.C., or the Bunker Hill smelter in Kellogg, Idaho. The early shipments of sulfide ore (galena) averaged 70 percent lead; shipments of carbonate ore (cerussite) averaged 27 percent lead (Jenkins, 1924). The estimated combined production from both mines through approximately 1976 (Mills, 1977) is 80,000 tons of ore yielding 46.3 million pounds of lead. Silver, copper, and zinc were recovered in significantly smaller quantities. Both properties underwent major changes in stew-

ardship over the years. A condensation of principal parties involved in mining and approximate dates is given in Appendix B (Gladstone) and Appendix C (Electric Point).

GEOLOGIC SETTING

Both mines are in dolomite or dolomitic limestone of the middle-Cambrian Metaline Limestone, a formation that is also host rock to large-scale lead-zinc mines 7 miles to the east near Metaline Falls. Mineralization is for the most part restricted to the intersections of steeply dipping fault zones. At these highly brecciated intersections, nearly vertical chimneys or pipes displaying roughly circular cross sections have formed. Estimates of the actual number of chimneys vary, but as many as 23 have been identified (Cole, 1949). Not all were found to contain economic lead values on the surface, and few have been explored at depth. These chimneys range from 30 to 240 feet in diameter and are 150 to 800 feet deep. According to Mills (1977), these features branch downward into separate roots or taper and pinch out.

The middle-Cambrian limestone and dolomite sediments (Metaline Formation) exposed on Gladstone Mountain are intruded by a quartz monzonite porphyry of probable Cretaceous age about 1 mile northwest of the Gladstone property. The same formation dipping gently to the west has yielded mines along Deep Creek (C. D. Campbell, unpub. USGS map, 1945, DGER mine map file). Most investigators agree that hydrothermal processes related to the batholith, either contemporaneous with or later than the preparatory faulting and brecciation, introduced galena into the favorable zones. Together with galena, siderite was introduced as a pervasive gangue mineral and is the most likely source of the dark red groundmass of limonite and various iron hydroxides. The ore contains almost no pyrite. Oxidation of galena has proceeded to great depths in the known deposits; consequently most of it has formed a granular sandy-textured cerussite. The galena not converted to cerussite occurs as high-grade boulders. In all the chimneys, including those in which lead mineralization is sparse or apparently nonexistent, limonite is the most prominent constituent and served as the key prospecting target.

Figure 7. General location of Setting Sun shaft, Gladstone mine.

Figure 8. Adit on Electric Point mine. Note distance between rock overhang and top of drift timber.

Exploration by drilling or drifting away from the chimneys during the course of mining was successful in discovering several blind mineralized zones, one of which began 80 feet below the surface. No reports identify the zinc mineral. If the degree of oxidation of a primary mineral such as sphalerite is similar to that of galena, zinc is probably present as granules of zincite or smithsonite. Although sphalerite and one of its oxidation products, smithsonite, are common in other deposits in northern Stevens County, none was found by the authors and none was reported by previous investigators Weaver (1920), Patty (1921), or Jenkins (1924).

Jenkins (1924) made several interesting observations regarding the chimneys' downward extension and their relationship to post-mineral glaciation: "It is the writer's understanding that thin stringers of ore…have been found leading off from the chimneys along fault zones. In following some of these stringers, new chimneys, which were not exposed on the surface, were in this way discovered in the mine. Also, some of the chimneys bottomed or terminated at depth in a rounded or bowl-shaped way. Beneath such a termination is solid limestone rock, like the solid rock which bounds the side of the chimneys." And, "A feature exposed in these glory holes which seems quite significant, is the unconformity between the oxidized zone below the surface and the overlying glacial drift which forms the surface mantle covering. In studying this feature, [it appears] that the oxidation of the ore body took place previous to the glacial pe-

riod. Evidently the ice did not remove the surface rocks or oxidized zones in this particular vicinity. Clastic dikes of limonitic clay ramify through the soft oxidized material of the chimneys. These dikes are beveled off at the surface with glacial drift overlying them unconformably." The nature of the chimney alteration was found to be essentially the same from the surface to the deepest workings at 800 feet (Mills, 1977).

OPENINGS

On the Gladstone claims, we found three areas that were either caved shafts or open pits, three large surface excavations with highwalls to 30 feet, and two open vertical shafts, unprotected and of unknown depth. One shaft, believed to be the Moonlight, was caved shut at the 40-foot depth in 2001 and at approximately twice that depth in 2002. It appears the bottom continues to fall through to the opening below. These two shafts present extreme physical hazards. We found an area of subsidence in the access road centerline that appears to be caving from subsurface openings. The Setting Sun shaft area was found on a patented claim of the same name. The shaft is caved and obliterated by subsidence in alluvium around the collar (Fig. 7). Dozer trenches from the 1946 work by USBM dot the landscape in every direction. A map in Cole's (1949) report is the best depiction of the extent of trenching. The trenches are typically several hundred feet long, 30 or more feet wide, and approximately 10 feet deep.

The most prominent feature at Electric Point is the glory hole 150 feet in diameter and 300 feet deep. The sides of dolomitic limestone are mostly vertical and the peripheral rim is unprotected. A few feet east of the glory hole, two large open pits have been cut into the hillside. These excavations appear to have been superimposed on existing underground stopes or drifts, as adits were discovered in each one. The back of one adit has fallen out, leaving the supporting stulls 3 feet short of overhanging country rock (Fig. 8). We could not locate the 800-foot inclined shaft that Electric Point sank and developed with eight levels. The portal of an adit, which entered this shaft on the 300-foot level, is located on the flank of Gladstone Mountain directly south of the glory hole at elevation 4160 (Jenkins, 1924) and is now caved. Refer to Table 2 for decimal locations and additional information on these openings.

MATERIALS AND STRUCTURES

The only recognizable structure at Gladstone was what may have been a combination ore-sorting house, storage bunker, and loading point (Fig. 9). This structure can be seen in the historic photo in Figure 10.

Charred ruins on the east-facing slope at Electric Point appear to be the location of cabins and offices shown in circa 1920 photographs (Patty, 1921). A clipping in the DGER mine file indicates that the gravity separation equipment strewn around a collapsed wood-frame structure is the mill reportedly built by State Mining Co. in 1954 (Fig. 11) with the loading bunker below (Fig. 12).

Figure 9. Loading bunker/sorting house at Gladstone mine.

Figure 10. Overview of Gladstone mine area, 1924. Photo by Olaf P. Jenkins. Structure in Figure 9 at right. View to the north.

WATER

We observed no water on the site in September of 2001 or September of 2002. This is not surprising given Patty's (1921) report that "no pumping is required from even the deepest mine workings… the lowest levels of the Electric Point mine show only a slight dripping of water, and in places are dry enough to be slightly dusty."

MILLING OPERATIONS

Both mines at one time or another built structures for the purpose of mechanically separating oxidized and sulfide ore from limonitic gangue. The buildings may have served as a convenient place to hand sort and store direct-ship ore or pass questionable ore over shaking tables and screens. As far as can be detected, no flotation or chemical mineral dressing was employed at either mine. If the iron-stained material below the mill structure at Electric Point are tailings, the total tonnage run through the separation process must have been minimal.

WASTE ROCK DUMPS

Cole (1949) analyzed several waste rock dumps by channeling and auger drilling at both mines. The results indicated that dumps adjacent to the Moonlight, Anderson, and Setting Sun shafts on the Gladstone property averaged 5 percent lead and 0.5 percent zinc. Similar results were obtained at an Electric Point

waste rock dump, but its specific location is unclear in light of the amount of material excavated and moved around the site between 1946 and today.

GENERAL INFORMATION

Names: Gladstone
Electric Point

MAS/MILS sequence number:
Gladstone: 0530650252
Electric Point: 0530650244

Access: four-wheel drive

Status of mining activity: none

Claim status:

Gladstone: The mine consists of five patented claims—Setting Sun, Moonlight, Silver Bell, Silver Bell Fraction, and Lone Star (Mineral Survey 1254, Nov. 1946; Patent no. 1129465).

Electric Point: The unpatented claims have been closed. The former mine property occupies lands administered by the USFS that are part of the Colville National Forest. No other claims are active in secs. 18 and 19 (BLM, written commun., 2004).

Current ownership: As of March 2004, title to the Gladstone property was held by R. D. MacArthur, Cusick, Wash. (Stevens Co. Assessor, written commun., 2004).

Surrounding land status: Colville National Forest

Location and map information: see Table 1

Directions: From Leadpoint, Wash., follow the Silver Creek Road east to a wye at approximately 1.7 miles. Stay on the righthand spur approximately 0.4 miles to an intersection with a gravel road leading south toward Windy Ridge. This road sidehills the ridge for 2.5 miles and crosses the West Fork Silver Creek. About 0.75 mile past the creek crossing, a log cabin (probably on the former Keystone mine land) provides a convenient place to park. The Gladstone and Electric Point lands lie a quarter mile west of the cabin. The West Fork Road was in good condition in September of 2002, however four-wheel drive is recommended. Numerous roads connect the two mine properties. Some exhibit surface subsidence. An alternate route winding around the northwest slopes of Gladstone Mountain, identified as the "Electric Point Road" on the Leadpoint USGS 7.5-minute quadrangle, is not recommended. It is badly eroded.

Figure 11. Mill ruins at Electric Point mine. Notebook for scale.

Figure 12. Loading bunker/sorting house at Electric Point mine. View to the south.

Table 1. Location and map information

Mine property	County	Location	Decimal latitude	Decimal longitude	1:24,000 quad.	1:100,000 quad.
Gladstone	Stevens	sec. 18, T39N R42E	48.8874	117.5448	Leadpoint	Colville
Electric Point	Stevens	secs. 17, 18, 19, T39N R42E	48.8824	117.5414	Leadpoint	Colville

MINE OPERATIONS DATA

Type of mine: underground and open pit

Commodities mined: lead, zinc, silver

Geologic setting: a replacement Mississippi Valley-type deposit in the middle unit of the Metaline Formation (Mills, 1977)

Ore minerals: galena, cerussite, zinc oxide and carbonate, pyromorphite, anglesite (Jenkins, 1924)

Non-ore minerals: siderite, limonite, clay

Period of production:

Gladstone: 1917–1926 principal period. Sporadic production by lessees until 1963 (DGER mine files).

Electric Point: 1916–1926 principal period. Sporadic production by lessees and various owners until 1964 (DGER mine files).

Development: Gladstone development exceeds 4000 feet of drifts, stopes, and open pit excavation. Development at Electric Point exceeds 10,000 feet.

Table 2. Mine features as noted in DGER field visits in September of 2001 and 2002. See Figure 2B for waypoints. – – –, no data; (G), Gladstone mine; (EP), Electric Point mine; *, data from DGER mine map file; **, numbered photos online at http://www.dnr.wa.gov/geology/iaml/04-19/

Description (waypoint no.)	Condition or comments	Fenced (yes/no)	Length (feet)	Width (feet)	Height/depth (feet)	True bearing	Digital Photo	Decimal latitude	Decimal longitude
(G) open pit or caved shaft (125)		no	50	30	15	– – –	– – –	48.88538	117.5432
(G) open pit or caved shaft (126)		no	30	30	8	– – –	– – –	48.88549	117.5435
(G) shaft (Moonlight?)(127)	open	no	6	6	300*	– – –	Fig. 4	48.88592	117.5439
(G) shaft (Anderson?)(129)	open	no	6	6	30 highwall	– – –	Fig. 5	48.88621	117.5442
(G) open pit (130)		no	50	50	30	– – –	DSCN2421**	48.88683	117.5443
(G) open pit or caved shaft (Johnson?)(134)			40	40	20	– – –	DSCN2422**	48.88667	117.5441
(G) subsidence in road centerline (132)		no	10	10	6	– – –	DSCN2423**	48.88663	117.5438
(G) mill site structure (133)						– – –	Figs. 9 & 10	48.88639	117.5438
(G) glory hole (136)			50	50	30	– – –	DSCN2427**	48.88736	117.5448
(G) conical tailings (137)			40	40	30	– – –	DSCN2429**	48.88745	117.5438
(G) shaft (Setting Sun)	caved alluvium around former opening	no	40	40	30	– – –	Fig. 7	48.88542	117.5459
(G) dozer trench circa 1946–1950 (72)	typical	no	200	25	10	– – –	Fig. 6	48.88468	117.5466
(G) found corner, patent claims: NE Setting Sun, SE Moonlight (71)	– – –	– – –	– – –	– – –	– – –	– – –	– – –	48.88552	117.5445
(EP) burned building (142)		no	40	30	40	– – –	none	48.88411	117.5419
(EP) open cut with adit at west end (143)		no	130	50	40 vert.			48.88353	117.5417
(EP) open cut with adit at east end; two 5000 gallon tanks, empty (144)	back has fallen out of adit; support stulls are 3 feet from overhead	no	40	70	20	S65W	Fig. 8	48.88324	117.5417
(EP) open cut (145)		no	140	70	35 vert.	– – –	DSCN2442**	48.88271	117.5418
(EP) concrete foundation	on east rim of gloryhole	no				– – –	DSCN2443**	48.88255	117.542
(EP) glory hole (147)	open	no	150	150	300 vert.		Fig. 3	48.8824	117.5424
(EP) caved portal, site of "300 level" access tunnel, elevation 4160 (148)	caved	no	600*	5	7	N32E	– – –	48.88173	117.5428
(EP) waste rock dump (151)		no	50	60	30	– – –	– – –	48.88271	117.5411
(EP) mill ruins (153)	collapsed	no	40	40			Fig. 11	48.88252	117.5405

Production: (Mills, 1977)

Mine	Lead (lbs)	Zinc (lbs)	Silver (ozs)
Gladstone	15,583,187	44,681	9602
Electric Point	30,711,917	10,691	7154

Mill data: Specifics unknown. Vast majority of shipments were run-of-mine ore. Indications are that hand-sorting and/or gravity separation methods were used.

PHYSICAL ATTRIBUTES

Features: see Table 2

Materials: none

Machinery: none

Structures: Former sorting mill at Gladstone still standing. Other structures in ruins or burned.

Waste rock dumps, tailings, impoundments, highwalls, or pit walls: Mineralized waste rock dumps and tailings in excess of 40,000 tons combined total of both properties (Cole, 1949). Numerous pits and highwalls.

Analysis of tailings and dumps: see Tables 3 and 4

Waste rock, tailings, or dumps in excess of 500 cubic yards: yes

Reclamation activity: none

VEGETATION

Aspen, Douglas fir, pine, spruce, larch, fireweed, and montane shrubs observed.

WILDLIFE

The Washington Department of Fish and Wildlife (WDFW) Habitat and Species Report for the Gladstone Mountain area, including the former Gladstone and Electric Point mines, shows

that lynx inhabit the region (WDFW, 2002). See Table 5 for bat habitat information.

WATER QUALITY

Surface waters observed: West Fork Silver Creek

Proximity to surface waters: 0.7 mile

Domestic use: unknown

Acid mine drainage or staining: none

Surface water migration: none

Table 3. Soil analysis. Metal concentrations are mg/kg. Number in parentheses is waypoint number from Figure 2B. – – –, no data. Analyses in bold indicate levels that exceed one or more standards for unrestricted land use shown in Table 4

Sample location	Arsenic	Cadmium	Copper	Iron	Lead	Mercury	Zinc	Gold
Gladstone conical tailings pile near Moonlight shaft (127)	– – –	10.6	– – –	– – –	**17,200**	– – –	**3650**	– – –
Gladstone mill site dump material (133)	– – –	26.1	– – –	– – –	**30,500**	– – –	**8040**	– – –
Electric Point limonite surface nodule	– – –	11.3	– – –	– – –	6280	– – –	3310	– – –

Table 4. Soil quality standards for unrestricted land use. WAC 173-340-900, Model Toxics Control Act, Table 749-2: Priority contaminants of ecological concern for sites that qualify for the simplified terrestrial ecological evaluation procedure (partial data). Concentrations are mg/kg. Levels for gold and iron are not specified

Metals	Arsenic[III]	Cadmium	Copper	Lead	Mercury	Zinc
mg/kg	20	25	100	220	9	270

Table 5. Bat habitat information

Opening	Aspect	Air temp. (°F) at portal	Air flow: exhaust	Air flow: intake	Multiple interconnected openings	Bats or bat evidence
adit at end of open pit, Electric Point mine	SW	67	none	none	unknown	none

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Appendix A. Photographic documentation, methods, and field equipment

PHOTOGRAPHIC DOCUMENTATION

Photos (JPEG format) listed in tables may be found on our website at http://www.dnr.wa.gov/geology/iaml/04-19/.

METHODS

We recorded observations and measurements in the field. Longitude and latitude were recorded with a global positioning system (GPS) unit in NAD83 decimal degree format. Literature research provided data on underground development, which was verified in the field when possible.

Soil samples from dumps or tailings were taken from subsurface material and double bagged in polyethylene. Chain of custody was maintained.

Soil samples were analyzed for the metals listed in this report by inductively coupled plasma/mass spectrometry (ICP/MS) following USEPA Method 6010. Holding times for the metals of interest were observed.

Instrument calibration was performed before each analytical run and checked by standards and blanks. Matrix spike and matrix spike duplicates were performed with each set.

FIELD EQUIPMENT

barometric altimeter
binoculars
digital camera
flashlight
Garmin GPS III+, handheld GPS unit
Hanna Instruments DiST WP-3 digital conductivity meter and calibration solution
litmus paper, range 0–14, and 4–7
Oakton digital pH meter
Oakton digital electrical conductivity meter
Taylor model 9841 digital thermometer

Appendix B. Gladstone mine ownership/activity overview

Date	Ownership	Activity
1915		Location and formation of Gladstone Mountain Mining Co. (GMMC).
1917	Gladstone Mountain Mining Co.	First production shipments
1917–1928	Gladstone Mountain Mining Co.	Developed chimneys, sank 800-foot shaft, did several thousand feet of development. Shipped 17,500 tons of ore containing 14,000,000 pounds lead.
1928–1944	Gladstone Mountain Mining Co.	Leased by seven different parties. Total production ~1200 tons containing 1,600,000 pounds lead.
1946	Gladstone Mountain Mining Co.	Dozer trenching by USBM, *see* Cole (1949). Mineral Survey 1254 for patent of Lone Star, Silver Bell, Silver Bell Fraction, Setting Sun, and Moonlight claims.
July 1950	Gladstone Mountain Mining Co.	Patent no. 1129465 issued for above named claims.
June 1952	Gladstone Mountain Mining Co.	Mining by A. G. Lotze on lease from GMMC.
1953–1954	Gladstone Mountain Mining Co.	Lotze sinking shaft.
1956	Gladstone Mountain Mining Co.	Arson fire in new shaft. Lotze shipped galena boulders up to 9 tons to Bunker Hill smelter. Open pit mining, probably around the Johnson shaft area.
1959	Gladstone Mountain Mining Co.	Lotze still leasing. Stockholders meeting in Spokane offices GMMC.
1962–1964	Gladstone Mountain Mining Co.	GMMC lease to Shamrock Mining Co. Shipping high-grade ore to Bunker Hill smelter. Uncovered top of new chimney by dozer trenching. [Shamrock Mining dissolved in 1971.]
June 1966	Gladstone Mountain Mining Co.	Stardust Mining Co. (Spokane) takes 10-year lease and option from GMMC. GMMC appoints new board of directors and officers. [Stardust Mining dissolved in 1978.]
Dec. 1967	Gladstone Mountain Mining Co.	GMMC reorganizes again. Attorney John Campbell named President, new board elected.
Aug. 1969	Gladstone Mountain Mining Co.	New 10-year lease to A. G. Lotze plus option to buy at $90,000.
Feb. 1970	Gladstone Mountain Mining Co.	Reorganization meeting of GMMC due to lost shareholders.
June 1975	Gladstone Mountain Mining Co.	GMMC reorganized as Gladstone Resources Inc. with Secretary of State.
1999	no data	Gladstone Resources Inc. became Gladstone Energy Inc., and merged into a company of the same name incorporated in Delaware, not qualified in Washington.
2004	R. D. McArthur, Cusick, Wash.	Unknown

Appendix C. Electric Point mine ownership/activity overview

Date	Ownership	Activity
1915–1918	R. Young	Electric Point Mining Co. incorporated and registered with Secretary of State.
1919–1933	Electric Point Mining Co.	Continuous production and shipments to Northport smelter (up to 1922) and Trail, B.C.
1934–1935	Electric Point Mining Co.	Property goes into receivership. Electric Point Mining Co. dissolved July 1935.
1935	Arthur Simonton, Leadpoint, Wash., *aka* Simonton Mining Co.	Leased to Walter and Howard Johnson. Lessors cleared and retimbered original 800-foot inclined shaft with eight levels.
1939	Arthur Simonton	Lessors shipped five cars averaging 78 percent lead.
1946–1949	Arthur Simonton	Dozer trenching by USBM (Cole, 1949).
Aug. 1950	Arthur Simonton	Leased by Leadpoint Electric Mining Co. Shipped 106 tons to Bunker Hill smelter.
Dec. 1951	Arthur Simonton	State Mining Co. and Northwest Mining Syndicate operators and lessors. Excavated glory hole (Fig. 3) "135 feet wide by 300 feet deep" on chimney and former site of 800-foot shaft using dragline with clamshell bucket.
Apr. 1953	Arthur Simonton	Original level 3 adit driven from the south into the main Electric Point chimney reopened and retimbered for 1000 feet. Underground hoist installed on 300 level.
Aug. 1953	Arthur Simonton	Electric Point mine willed to Spokane Shriners Hospital for Children by Maude Simonton, widow of Arthur Simonton, subject to lease and option agreement with State Mining Co.
June 1954	Arthur Simonton	Leased by State Mining Co. Small gravity separation mill built with shipping dock at elevation 4400 feet.
Jan. 1955	State Mining Co., Colville, Wash.	State Mining Co. exercised purchase option and turned property over to Northwest Mining Syndicate to operate.
Feb. 1961	State Mining Co., Colville, Wash.	Estate of Fred Viles, *aka* State Mining Co., leased property to Superior Mining and Dredging Co. [Superior Mining dissolved 1970.]
Aug. 1962	State Mining Co., Colville, Wash.	Leased to Shamrock Mining Co., which did surface mining with backhoe and dozer. [Shamrock Mining dissolved 1971.]
Nov. 1964	State Mining Co., Colville, Wash.	Stardust Mining sank a 6 x 6-foot shaft, location unknown. [Stardust Mining dissolved 1978.]
Aug. 1965	Andrew Anderson	Leased to Bunker Hill Mining Co., which did exploration drilling.
1976	State Mining Co.	Unknown. The State Mining Co. registered with Secretary of State, December 1948. License expired July 2001.